



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: 700 MARYLAND AVENUE, SE, WASHINGTON, DC 20591-0000
Washington, DC 20591-0000
888-777-4767

APPLICATION NO	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO	CONFIRMATION NO
09/770,289	01/29/2001	Atsushi Shiota	202450US0	6290

22850 7890 12/18/2002
OBLON SPIVAK MCCLELLAND MAIER & NEUSTADT PC
FOURTH FLOOR
1755 JEFFERSON DAVIS HIGHWAY
ARLINGTON, VA 22202

EXAMINER

FEELY, MICHAEL J

ART UNIT	PAPER NUMBER
----------	--------------

1712 13
DATE MAILED: 12/18/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Application No.

Applicant(s)

09/770,289

SHIOTA ET AL.

Examiner

Art Unit

Michael J Feely

1712

Office Action Summary

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) Responsive to communication(s) filed on 07 October 2002.

2a) This action is **FINAL**. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) Claim(s) 1-15 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) Claim(s) _____ is/are allowed.

6) Claim(s) 1-15 is/are rejected.

7) Claim(s) _____ is/are objected to.

8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) The proposed drawing correction filed on _____ is: a) approved b) disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some * c) None of:

1. Certified copies of the priority documents have been received.
2. Certified copies of the priority documents have been received in Application No. _____.
3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)1) Notice of References Cited (PTO-892)4) Interview Summary (PTO-413) Paper Notes2) Notice of References Cited (PTO-892) Electronically

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) submitted on October 7, 2002 was filed after the mailing date of the Notice of Allowance on September 19, 2002. The submission is in compliance with the provisions of 37 CFR 1.97. Accordingly, the information disclosure statement is being considered by the examiner.

Allowable Subject Matter

2. Prosecution on the merits of this application is reopened on claims 1-15 considered unpatentable for the reasons indicated below:

Applicant has filed an Information Disclosure Statement after the mailing date of the Notice of Allowance. Included in this Information Disclosure Statement is Ross (US Pat. No. 6,204,201), which the Examiner has found to be relevant prior art. A rejection of claims 1-15 under 35 USC 102(e)/103 over Ross is set forth below.

3. Applicant is advised that the Notice of Allowance mailed is vacated. If the issue fee has already been paid, applicant may request a refund or request that the fee be credited to a deposit account. However, applicant may wait until the application is either found allowable or held abandoned. If allowed, upon receipt of a new Notice of Allowance, applicant may request that the previously submitted issue fee be applied. If abandoned, applicant may request refund or credit to a specified Deposit Account.

Claim Rejections - 35 USC § 102/103

basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language;

or

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(e) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

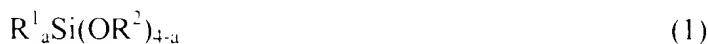
5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

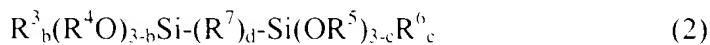
6. Claims 1-15 are rejected under 35 U.S.C. 102(e) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Ross (US Pat. No. 6,204,201).

comprising at least one siloxane compound (column 2, line 63 through column 3, line 5) with

electron beams at an irradiation dose of from 1 to 200 $\mu\text{C}/\text{cm}^2$ (column 6, lines 12-16 and 18-21); **(3)** wherein the siloxane compound is a product of the hydrolysis and/or condensation of at least one compound selected from the group consisting of compounds represented by the following formula (1):



wherein R^1 represents a monovalent organic group or a hydrogen atom; R^2 represents a monovalent organic group; and a is an integer of 0 to 2, and compounds represented by the following formula (2):



wherein R^3 , R^4 , R^5 , and R^6 may be the same or different and each represents a monovalent organic group; b and c may be the same or different and each is an integer of 0 to 2; R^7 represents an oxygen atom or a group represented by $-(\text{CH}_2)_n-$, wherein n is 1 to 6; and d is 0 or 1 (column 2, line 63 through column 3, line 47; column 3, line 66 through column 4, line 57); **(4)** wherein the film comprising a siloxane compound is an organic silica film (column 3, line 66 through column 4, line 57); **(5)** wherein the film comprising a siloxane has a thickness of from 0.05 to 3 μm (column 5, lines 16-24); **(6)** wherein the electron beam irradiation is conducted at an energy of from 0.1 to 50 keV (column 6, lines 8-12 and 18-20); **(7)** wherein the electron beam irradiation is conducted at 25 to 500°C (column 6, lines 5-8); **(8)** wherein the electron beam irradiation is conducted in an atmosphere having an oxygen concentration of 10,000 ppm or at 133.3 Pa or lower (column 6, lines 5-8); **(11)** wherein the film comprising a siloxane

compound is heat-cured at 300 to 500°C before being subjected to the electron beam irradiation (column 5, lines 38-54); (12) a silica-based film obtained by the process as claimed in claim 1 (Abstract; column 1, lines 6-13); (13) the silica-based film as claimed in claim 12, which has a carbon content of from 5 to 17% by mole (column 3, line 66 through column 4, line 27); (14) a low-dielectric film comprising the silica-based film as claimed in claim 12 (Abstract; column 1, lines 6-13); and (15) a semiconductor device having the low-dielectric film as claimed in claim 14 (Abstract; column 1, lines 6-13).

It should be noted that regarding claim 8, Ross teaches the use of, "nitrogen, hydrogen, argon, oxygen, any combination of gases." (column 6, lines 40-42). The use of any of these gases, excluding oxygen, would have inherently provided an atmosphere having an oxygen concentration of 10,000 ppm or lower because this range is interpreted to include no oxygen at all.

Ross does not explicitly disclose that the electron beam treatment converts the film into: a film having a dielectric constant of 3 or lower, or 2.8 or lower; and film having silicon carbide bonds represented by Si-C-Si. This is considered to be an inherent result of the electron beam treatment. The electron-beam treatment would have resulted in a re-ordering of atoms within the siloxane film, and subsequently, the dielectric constant of the film would have been altered. This inherent characteristic is supported by the disclosure of Ross. Ross teaches all of the starting materials and process parameters claimed in the instant invention. By using the same starting

conditions, the effect on these starting materials, namely the reordering of atoms to provide Si-C-Si bonds, and the final properties of the treated materials, namely the dielectric constant, would have also been the same.

Therefore, if not explicitly taught in the reference, then the teachings would have been obvious to one of ordinary skill in the art at the time of the invention.

Comments

7. In the Information Disclosure Statement, filed October 7, 2002, Applicant included comments regarding the Ross reference. Applicant states:

“Ross discloses an electron beam dose in a broad range of “1 to 100,000 $\mu\text{C}/\text{cm}^2$ ” at column 6, lines 14-21. Thus, the electron beam dose in a range of “1 to 200 $\mu\text{C}/\text{cm}^2$ ” which will be recited in claim 1 *overlaps* with the broad range disclosed in Ross.

However, on review of Ross, *the Examples do not show* the electron beam dose.

The present invention forms a film having Si-C-Si bond by combing a specific material of siloxane compound with a specific beam dose of “1 to 200 $\mu\text{C}/\text{cm}^2$ ”. *This electron beam dose range of “1 to 200 $\mu\text{C}/\text{cm}^2$ ” in the present invention is very specific range from the broad range of “1 to 100,000 $\mu\text{C}/\text{cm}^2$ ” discloses in Ross.*

It is therefore not believed that the disclosure of Ross renders the claimed invention obvious.”

It should be noted that in addition to the broad range of “1 to 100,000 $\mu\text{C}/\text{cm}^2$ ”, Ross also teaches preferred ranges of: 100 to 10,000 $\mu\text{C}/\text{cm}^2$, 1 to 8,000 $\mu\text{C}/\text{cm}^2$, and 100 to 5,000 $\mu\text{C}/\text{cm}^2$ (column 6, lines 15-21). All of these ranges, including the broad range, overlap the claimed range.

Furthermore, although the Examples in Ross do not disclose the claimed electron beam dose range, it has been found that disclosed examples and preferred embodiments do not

would have reasonably suggested to one having ordinary skill in the art, including nonpreferred embodiments – *Merck & Co. v. Biocraft Laboratories*, 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), *cert. denied*, 493 U.S. 975 (1989).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael J Feely whose telephone number is 703-305-0268. The examiner can normally be reached on M-F 8:30 to 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert Dawson can be reached on 703-308-2340. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Michael J. Feely
November 21, 2002

Michael J. Feely
Michael J. Feely
PTO-904a
11/21/02